



PHOTOXYGENATION OF FURANS IN ENVIRONMENTALLY FRIENDLY SOLVENTS

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Health and daily life rely on man-made substances such as pharmaceuticals, fine chemicals, synthetic fibers and plastics. However, many existing chemical processes, though beneficial, produce unwanted wastes along with target products, and inefficient recovery of solvents is an environmental problem. Hence high attention of the scientific community is currently directed at developing new benign and clean processes or products. In this context, dye-sensitized photooxygenation appears to be one of the most promising oxidation route: i) the sole oxygen source is natural triplet oxygen, ii) a complete atom economy can be reached since both oxygen atoms are incorporated in the final products, iii) reactions of the reactive species, singlet oxygen, are highly selective and show all kinetic properties of pericyclic reactions.¹ One drawback is due to singlet oxygen has its longest lifetimes in environmentally problematic solvents such as halogenated hydrocarbons or benzene. The goal of our work has been to prove “green” solvents from water to ionic liquids, in particular, 1-ethyl-3-methylimidazolium bromide ([emim]Br) and 1-butyl-3-methylimidazolium tetrafluoroborate ([bmim]BF₄). We used furans as substrates due to the well known reactivity of this system in the photooxygenation reactions (our group has a long experience in this field) but mainly due to the wide number of related synthetic applications.²

The reactions have been carried out at 0-10 °C with Bengal Rose as sensitizer. The solution irradiated with a sunlamp. Comparing with previous results in halogenated solvents, no appreciable effect on the reaction times has been observed evidencing the extraordinary reactivity of furan system towards singlet oxygen. Moreover, despite the wide range of possible products, two main products in high to quantitative yields have been isolated: enediones from α,α' -substituted furans and (5*H*)-furanones from furans with at least one hydrogen at α -position.

The results appear very promising for the mild conditions, the high selectivity and for giving interesting compounds. Enediones are useful building blocks and hydroxyfuranone system is present in a wide range of natural and synthetic products, often with biological properties.

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